

#0 – What are the three errors?

#1 – When `mysteryAnimal` is declared, the next instruction prints out: “The animal is initialized to: ...” It is never initialized to a variable. Why does this not crash?? What is it being initialized to??

It is being initialized to Cat. First Print Line States that. Pointer not initialized. Random Memory Behavior.

Fixed by initializing pointer to an actual object created.

Initialized to “unknown” (default) as expected.

#2 – Why is your program crashing on this line: `std::cout << "The animal should initially be nothing:..."`?

Comment out line 38. Initializing Animal* to “nullpointer” does bad stuff.

If it works, don’t ask too many questions.

Basically, the `nullptr` removes what it points to, which has all the info. You can’t pull data from something with no data. So it crashes.

#3 – Run the program for 3 different guesses. On each guess, print out:

- - The address of the `mysteryAnimal` pointer
- - The address where the pointer is pointing
- - The value located at the address where the pointer is pointing.
- - Draw a picture diagraming each of these memory locations with their values.
- - Is the stack growing from the bottom (0x0000....) or the top (0xFFFF...) of memory?

#4 - Relative to the stack and heap, where is the `staticWelcomeMessage` located? What is its address? Add it to the diagram. **Address: 0x7ff7404250a0**

Fix: Put the delete function at the end, but INSIDE the while loop. Not outside. Deletes each mystery animal before making the new one.

```
Windows PowerShell
PS C:\Users\dylan\Documents\GitHub\CS3022_Labs\GIT CLONE Lab3\lab03_guess_whos_fault> g++ -o animal_guess.exe animal_guess.cpp
PS C:\Users\dylan\Documents\GitHub\CS3022_Labs\GIT CLONE Lab3\lab03_guess_whos_fault> .\animal_guess.exe
Welcome to the Animal Guesser!
Guess the Animal! (1: Dog, 2: Cat, 3: Bird, 4: Fish)
Enter 0 to quit.
The animal is initialized to: Unknown
The animal should initially be nothing: Unknown

[DEBUG INFO]
Address of pointer variable (&mysteryAnimal): 0xaebfff7c8
Address pointer is pointing to (mysteryAnimal): 0x16fc758e3b0
Value stored at that address (*mysteryAnimal): 4 (Fish)

Your guess: 2
Wrong! It was Fish

[DEBUG INFO]
Address of pointer variable (&mysteryAnimal): 0xaebfff7c8
Address pointer is pointing to (mysteryAnimal): 0x16fc758d830
Value stored at that address (*mysteryAnimal): 1 (Dog)

Your guess: 3
Wrong! It was Dog

[DEBUG INFO]
Address of pointer variable (&mysteryAnimal): 0xaebfff7c8
Address pointer is pointing to (mysteryAnimal): 0x16fc758d850
Value stored at that address (*mysteryAnimal): 3 (Bird)

Your guess:
```

Same address of pointer variable (same pointer)

Different address of variable pointed to (memory allocation).

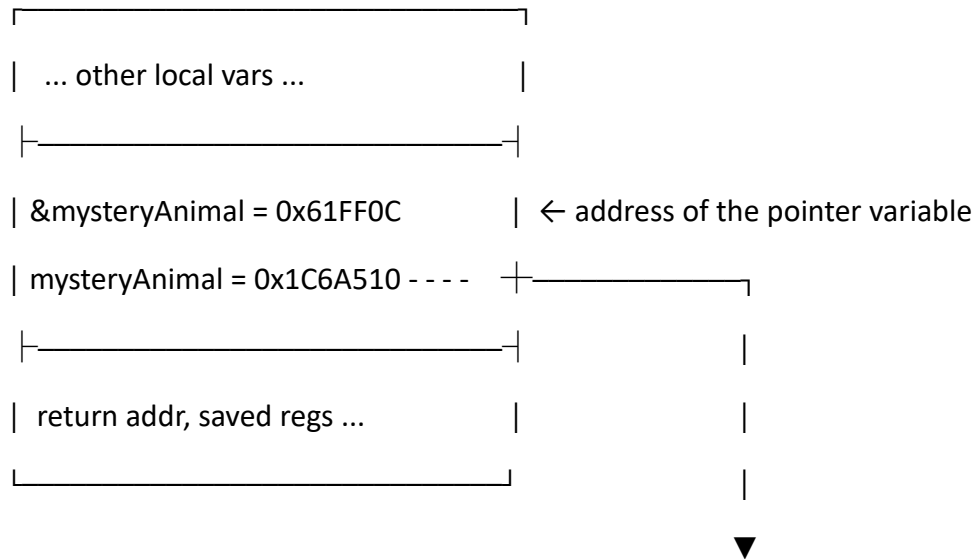
e3b0 – 58288

d830 – 55344

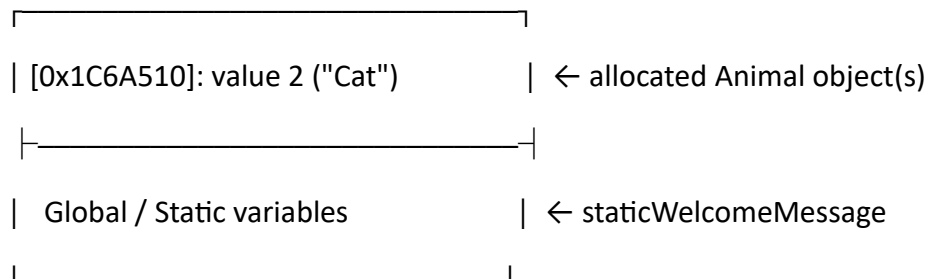
d850 – 55376

Grows from the top. (Depends how you draw it, I guess). You place an object, then place another one on top, then another, like a stack of pancakes. Memory is allocated descending order.

Stack Memory (grows downward)



Heap Memory (grows upward)



FIX!

After moving delete to inside the loop, all pointer addresses match. Stack is not growing.
Problem

```
Windows PowerShell

Your guess: 0
Bye!
PS C:\Users\dylan\Documents\GitHub\CS3022_Labs\GIT CLONE Lab3\lab03_guess_wh
os_fault> g++ -o animal_guess.exe animal_guess.cpp
PS C:\Users\dylan\Documents\GitHub\CS3022_Labs\GIT CLONE Lab3\lab03_guess_wh
os_fault> .\animal_guess.exe
Welcome to the Animal Guesser!
[DEBUG INFO]
Address of staticWelcomeMessage variable: 0x7ff6d2fc8040
Address of string literal ("Welcome to the Animal Guesser!"): 0x7ff6d2fc50a0
Guess the Animal! (1: Dog, 2: Cat, 3: Bird, 4: Fish)
Enter 0 to quit.
The animal is initialized to: Unknown
The animal should initially be nothing: Unknown

[DEBUG INFO]
Address of pointer variable (&mysteryAnimal): 0xe232dff7d8
Address pointer is pointing to (mysteryAnimal): 0x262fe2dc4d0
Value stored at that address (*mysteryAnimal): 4 (Fish)

Your guess: 1
Wrong! It was Fish

[DEBUG INFO]
Address of pointer variable (&mysteryAnimal): 0xe232dff7d8
Address pointer is pointing to (mysteryAnimal): 0x262fe2dc4d0
Value stored at that address (*mysteryAnimal): 1 (Dog)

Your guess: 2
Wrong! It was Dog

[DEBUG INFO]
Address of pointer variable (&mysteryAnimal): 0xe232dff7d8
Address pointer is pointing to (mysteryAnimal): 0x262fe2dc4d0
Value stored at that address (*mysteryAnimal): 3 (Bird)

Your guess: 3
Correct! It was Bird

[DEBUG INFO]
Address of pointer variable (&mysteryAnimal): 0xe232dff7d8
Address pointer is pointing to (mysteryAnimal): 0x262fe2dc4d0
Value stored at that address (*mysteryAnimal): 3 (Bird)

Your guess: |
```